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TRANSMITTAL OF APPEAL BRIEF (Large Entity)

Docket No.
BUR919990190US1

Inventor: **Douglas D. Coolbaugh, et al.**

Serial No.	Filing Date	Examiner	Group Art Unit
09/516,615	March 1, 2000	Cuong Q. Nguyen	2811

Invention: **METHOD OF FABRICATING A POLYSILICON CAPACITOR UTILIZING FET AND BIPOLAR BASE POLYSILICON LAYERS**

TO THE COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on February 24, 2004.

The fee for filing this Appeal Brief is: **\$330.00**

- ☐ A check in the amount of the fee is enclosed.
- ☒ The Director has already been authorized to charge fees in this application to a Deposit Account.
- ☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **09-0456/IBM**


Signature

Dated: **April 22, 2004**

Leslie S. Szivos, Ph.D.
Registration No. 39,394
SCULLY, SCOTT, MURPHY & PRESSER
400 Garden City Plaza
Garden City, New York 11530
(516) 742-4343
LSS:HAH:kc

I certify that this document and fee is being deposited on **4/22/04** with the U.S. Postal Service as first class mail under 37 C.F.R. 1.8 and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.


Signature of Person Mailing Correspondence

Leslie S. Szivos, Ph.D.

Typed or Printed Name of Person Mailing Correspondence

cc:



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Douglas D. Coolbaugh, et al. Examiner: Cuong Q. Nguyen

Serial No: 09/516,615

Art Unit: 2811

Filed: March 1, 2000

Docket: BUR919990190US1 (13020)

**For: METHOD OF FABRICATING A
POLYSILICON CAPACITOR
UTILIZING FET AND BIPOLAR BASE
POLYSILICON LAYERS**

Dated: April 22, 2004

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPELLANTS' BRIEF ON APPEAL

1. Real Party in Interest

The real party in interest of the present application is International Business Machines Corporation, the assignee of the entire right, title and interest in the above-identified patent application.

2. Related Appeals and Interferences

No other appeals or interferences are known which directly affect, or will be directly affected by, or have a bearing on, the disposition of the pending appeal.

3. Status of the Claims

The present application was filed on March 1, 2000 with Claims 1-30. In response to a Restriction Requirement imposed in an Office Action dated September 7, 2001, Appellants elected, without traverse, to prosecute Claims 24-30. This action was performed in

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Appellants' Response, dated October 4, 2001. The non-elected claims, i.e. 1-23, were subsequently withdrawn from the case as being directed to a non-elected invention.

A first Office Action on the merits issued December 5, 2001, to which Appellants filed an amendment and response dated March 4, 2002. In the March 4, 2002 response, Appellants cancelled the non-elected claims, without prejudice or disclaimer, and amended Claims 24, 25, and 26. In response to a Final Rejection dated May 28, 2002, Claims 24 and 26 were amended for a second time and Claim 30 was amended for a first time. These actions were performed in Appellants' Response, under 37 C.F.R. §1.116, dated July 26, 2002. The amendments to Claims 24, 26 and 30 were not entered in the Advisory Action dated August 1, 2002. A Request for Continued Examination (RCE) was filed on August 28, 2002, requesting entry of the amendments to Claims 24, 26, and 30 made in Appellants' Response of July 26, 2002.

A Notice of Allowance issued on November 5, 2002, in which Claims 24-30 were deemed allowable over the closest prior art of record. The Notice of Allowance was withdrawn over newly cited art in an Office Action dated March 7, 2003. In response to the March 7, 2003 Office Action, Claims 24 and 26 were amended in Appellants' response dated July 7, 2003. A Final Rejection issued on September 24, 2003, in which Claims 24-28 were rejected and Claims 29 and 30 were deemed allowable subject matter. No amendments to the finally rejected claims were submitted with Appellants' Response dated December 23, 2003. In response to the Final Rejection (dated September 24, 2003), Appellants filed a Notice of Appeal on February 24, 2004.

Thus, Claims 24-30 are the subject of this appeal; these claims, as they presently stand, are set forth in the Appendix of this Appeal Brief. The status of each of the claims is thus as follows:

Claims 1-23: Canceled on March 4, 2002.

Claims 24-28: Finally rejected and on appeal.

Claims 29-30: Allowable subject matter.

4. Status of the Amendment

A Response to the Final Rejection dated September 24, 2003 containing arguments for patentability was filed on December 23, 2003. No amendments to the claims were filed with the December 23, 2003 Response; hence that Response was entered and considered by the Examiner.

5. Summary of Invention

The invention embodied by Claims 24-30, on appeal, relates to a poly-poly capacitor 49, as depicted in FIG. 1F, comprising an upper plate electrode 42, 43 and a lower plate electrode 26, wherein at least the upper plate electrode 42, 43 is composed of SiGe polysilicon. The plate electrodes 42, 43, 26 of the poly-poly capacitor 49 are separated by an insulator structure 32. The upper plate electrode 42, 43 is located directly above the insulator structure 32 and the lower plate electrode 26 is located directly below the insulator structure 32. The planar upper plate electrode 42, 43 and the lower plate electrode 26 can both be composed of SiGe polysilicon. The lower plate 26 electrode may also be composed of polysilicon. In one embodiment, at least one of the plate electrodes can be polysilicon from an FET gate or a bipolar emitter, as depicted in FIG. 1F. Alternatively, the poly-poly capacitor may be formed independently, as depicted in FIG. 3.

6. Issues on Appeal

- I. Does U.S. Patent No. 6,251,720 to Thakur, et al. anticipate Appellants' structure, as recited in Claims 24-26, on appeal?
- II. Does U.S. Patent No. 6,251,720 to Thakur, et al. anticipate Appellants' structure, as recited in Claim 27, on appeal?

- III. Does U.S. Patent No. 6,251,720 to Thakur, et al. render Claim 27, on appeal, unpatentable under 35 U.S.C. §103(a)?
- IV. Do the combined disclosures of U.S. Patent No. 6,251,720 to Thakur, et al. and U.S. Patent No. 6,150,701 to Lee, et al. render Claim 28, on appeal, unpatentable under 35 U.S.C. §103(a)?

7. Grouping of the Claims

The Claims involved in Issue I stand and fall together.

Issue II relates to a single claim.

Issue III relates to a single claim.

Issue IV relates to a single claim.

8. Arguments for Patentability

- I. Thakur, et al. fail to anticipate Appellants' structure, as recited in Claims 24-26, on appeal.

In the Final Rejection dated September 24, 2003, Claims 24-26, relating to Appellants' poly-poly capacitor, were rejected under 35 U.S.C. § 102(e) as allegedly anticipated by Thakur, et al. Appellants respectfully disagree with the Examiner's conclusion that Thakur, et al. anticipate Appellants' invention and submit the following.

It is axiomatic that anticipation under §102 requires that the prior art reference disclose *every element* of the claim to which it is applied. *In re King*, 801 F.2d 1324, 1326, 231 USPQ 36, 138 (Fed. Cir. 1986). Thus, there must be *no* differences between the subject matter of the claims and the disclosure of the applied prior art reference. Stated in another way, the reference must contain within its four corners adequate direction to practice the invention as claimed. The corollary of this rule is equally applicable. The absence from the applied reference of any claimed element negates anticipation. *Kolster Speedsteel AB v. Crucible Inc.*, 793, F.2d 1565, 1571, 230 USPQ 81, 84 (Fed. Cir. 1986).

Appellants respectfully submit that Claims 24-26 are not anticipated by the disclosure of Thakur, et al., since the applied reference does not disclose each and every element of Appellants' claimed poly-poly capacitor, which comprises an upper plate electrode composed of *SiGe polysilicon*. The term "SiGe polysilicon" is used in the present invention to denote a polysilicon germanium layer.

Referring to Pages 15-16 of the Appellants' specification, Appellants disclose that the SiGe polysilicon layers may be formed by depositing SiGe atop a layer of polysilicon, which is positioned over an oxide-containing region. Appellants further disclose the deposition conditions for forming SiGe polysilicon, where SiGe layers are formed by utilizing a low temperature deposition process. "More specifically, the deposition temperature is from about 400° to about 500°C." See Page 15 of Appellants' specification.

Appellants' submit that Claims 24-26 are not anticipated by Thakur, et al., since Thakur, et al. do not disclose a structure that includes at least an *upper plate electrode that is composed of SiGe polysilicon*, as recited in Claim 24. Relying on the passage beginning at Column 7, line 66, and continuing to Column 8, line 4, of Thakur, et al., it is the Examiner's position that, since Thakur, et al. teach that "polysilicon" or "SiGe" may be used as an electrode, Thakur, et al. disclose that "polysilicon SiGe" may be used as the upper electrode. Appellants respectfully disagree and note that SiGe polysilicon is substantially different from singular SiGe or polysilicon. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros v. Union Oil Co.*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Therefore, since SiGe polysilicon, as disclosed in Appellants'

specification, is substantially different from SiGe or polysilicon, as disclosed by Thakur, et al.; Thakur, et al. fail to teach a structure that includes an *upper plate electrode that is composed of SiGe polysilicon*.

The foregoing remarks clearly establish that the disclosure of Thakur, et al. do not teach every aspect of Claims 24-26, as required by *King and Kolster Speedsteel*; therefore the claims of the present invention are not anticipated by the disclosure of Thakur, et al. Appellants respectfully submit that Claims 24-26 are patentable over the disclosure of Thakur, et al.

II. Thakur, et al. fail to anticipate Appellants' structure, as recited in Claim 27, on appeal, under 35 U.S.C. §102(e).

In the Final rejection dated September 24, 2003, Claim 27 was rejected under 35 U.S.C. §102(e) as allegedly anticipated by Thakur, et al. Appellants respectfully disagree with the Examiner's conclusion that Thakur, et al. anticipate Appellants' invention and submit the following.

Claim 27 is dependent on independent Claim 24. If an independent claim is not anticipated, under 35 U.S.C. §102, than any claim depending therefrom is not anticipated. Claim 27 further defines the poly-poly capacitor recited in Claim 24 to include at least one plate electrode comprising polysilicon from an FET gate or a bipolar emitter.

Thakur, et al. fail to anticipate Claim 27 for the same reason Thakur, et al. fail to anticipate Claims 24-26. To reiterate, Thakur, et al. fail to disclose a structure that includes an *upper plate electrode that is composed of SiGe polysilicon*. Appellants respectfully submit that the above remarks, concerning the deficiencies of Thakur, et al. to anticipate

Claims 24-26, apply equally well to the anticipation rejection of Claim 27. Therefore, the remarks in Section I of this brief are incorporated by reference.

Since Thakur, et al. fail to teach each and every limitation of Appellants' poly-poly capacitor, as recited in Claim 27, Thakur, et al. do not anticipate Claim 27, under 35 U.S.C. §102(e). Appellants respectfully submit that Claim 27 is patentable over the disclosure of Thakur, et al.

III. Thakur, et al. do not render Claim 27, on appeal, unpatentable under 35 U.S.C. §103(a).

In the Final rejection dated September 24, 2003, Claim 27 was rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Thakur, et al. Appellants respectfully disagree with the Examiner's conclusion that Thakur, et al. render Appellants' invention obvious and submit the following.

Claim 27 is dependent on independent Claim 24. If an independent claim is non-obvious under 35 U.S.C. §103(a), then any claim depending therefrom is non-obvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). Appellants submit that Claim 27 is not unpatentable, under 35 U.S.C. §103(a), since Thakur, et al. fail to teach or suggest Appellants' poly-poly capacitor comprising an upper electrode composed of SiGe polysilicon, as recited in Claim 24. "To establish a prima facie case of obviousness of a claimed invention all the claimed limitations must be taught or suggested by the prior art" *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 44, 496 (CCPA 1970).

Appellants respectfully submit that the above remarks, concerning the deficiencies of Thakur, et al. to anticipate Claim 27, apply equally well to the obviousness rejection of

Claim 27, under 35 U.S.C §103(a). Therefore, the remarks in Section II of this brief are incorporated by reference.

The 35 U.S.C. §103 rejection of Claim 27 also fails because there is no motivation in Thakur, et al. that suggests modifying the structures described therein to include Appellants' claimed poly-poly capacitor, in which the *planar upper plate electrode is composed of SiGe polysilicon*. The rejection is thus improper since the prior art does not suggest this drastic modification.

The sole teaching of the material utilized for the plate electrodes in the Thakur, et al. capacitor is disclosed in Column 7, line 66-67, and Column 8, lines 1- 4, of the Thakur, et al. reference, in which Thakur, et al. disclose that the electrode material may be polysilicon, crystalline silicon, hemispherical grain polysilicon, germanium or silicon germanium that is deposited using chemical vapor deposition. No further details are provided by Thakur, et al. regarding the formation of the electrodes.

Appellants disclose that the SiGe polysilicon electrodes may be formed by depositing SiGe atop a layer of polysilicon 42, which is positioned over an oxide-containing region 12. Appellants further disclose the deposition variables for forming SiGe polysilicon, where SiGe layers are formed by utilizing a low temperature deposition process having a deposition temperature ranging from about 400° to about 500°C.

Therefore, since Thakur, et al. fail to disclose SiGe polysilicon or Appellants' process conditions for forming SiGe polysilicon, there is no motivation to modify the capacitor disclosed in Thakur, et al. to include an upper electrode composed of SiGe polysilicon. The law requires that a prior art reference provide some teaching, suggestion, or

motivation to make the modification obvious. *In re Fritch*, 972 F.2d, 1260,1266, 23 USPQ 1780,1783-84 (Fed. Cir. 1992).

Since Thakur, et al. fail to teach or suggest each and every limitation of Appellants' poly-poly capacitor, nor provide motivation to modify the capacitor disclosed in Thakur, et al. to produce Appellants' poly-poly capacitor, Thakur, et al. do not render Claim 27 unpatentable under 35 U.S.C. §103(a).

In view of the above remarks, Appellants respectfully submit that Claim 27 is patentable over Thakur, et al.

IV. The combined disclosures of Thakur, et al. and Lee, et al. do not render Claim 28, on appeal, unpatentable under 35 U.S.C. §103(a).

In the Final rejection dated September 24, 2003, Claim 28 was rejected under 35 U.S.C. §103 as allegedly unpatentable over the combination of Thakur, et al. and Lee. Appellants respectfully disagree with the Examiner's conclusion that the combination of Thakur, et al. and Lee render Appellant's invention unpatentable and submit the following.

Claim 28 is dependent on base Claim 24. Claim 28 further defines the poly-poly capacitor recited in Claim 24 to include a bipolar device region and an FET region, wherein the poly-poly capacitor, bipolar device region and FET region are electrically isolated from each by isolation regions. Thakur, et al. alone, or in combination with Lee, do not teach or suggest Appellants' claimed poly-poly capacitor structure including an *upper plate electrode composed of SiGe polysilicon*. "To establish a prima facie case of obviousness of a claimed invention all the claimed limitations must be taught or suggested by the prior art" *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 44, 496 (CCPA 1970).

Specifically, the principal reference spurring the present §103 rejection, i.e., Thakur, et al., is deficient for the same reasons Thakur, et al. do not render Claim 27 unpatentable under §103. Therefore, the remarks in Section III of this brief are incorporated herein by reference. To reiterate: Thakur, et al. do not teach or suggest a poly-poly capacitor structure which comprises planar upper and lower plate electrodes that are separated by an insulator structure, wherein at least the planar upper plate electrode is composed of *SiGe polysilicon* and said planar upper plate electrode is located directly above said insulator structure and said lower plate electrode is located directly below said insulator structure. In contrast, the capacitor structure disclosed in Thakur, et al. comprises a lower electrode 104 and upper electrode 106 which may be formed of polysilicon or SiGe. As stated above, Thakur, et al. fail to teach or suggest a capacitor having a *SiGe polysilicon upper electrode*.

The applied secondary reference, i.e., Lee, does not alleviate the above mentioned defects in Thakur, et al., since Lee also does not teach or suggest Appellants' claimed poly-poly capacitor structure which comprises planar upper and lower plate electrodes that are separated by an insulator structure, wherein at least the *upper plate electrode is composed of SiGe polysilicon*.

Lee discloses a semiconductor device which includes a substrate having a plurality of device isolation regions, first and second n-wells horizontally spaced apart from either of the plurality of device isolation regions, a p-channel transistor formed in a second n-well, an input protection transistor horizontally spaced apart from the first n-well and the device isolation regions, on a symmetrical portion by the first n-well to the second n-well, and a guard ring formed between the first n-well and the input transistor. The disclosure of Lee

does not teach or suggest the presence of any capacitor structure, let alone the claimed poly-poly capacitor structure wherein *the upper plate electrode is composed of SiGe polysilicon*, as recited in amended Claim 24.

Appellants note that there is a single reference to Wu, et al. on Page 5 of the Final Rejection dated September 24, 2003. The Examiner alleges that since Wu, et al. disclose a capacitor structure separated from other active regions by an isolation region, that it is allegedly obvious for one of ordinary skill in the art to utilize an isolation region to separate an FET region from a capacitor when incorporating the circuitry as taught by Lee into Thakur, et al. No further comments are provided regarding Wu, et al.

Appellants note that Wu, et al. was previously cited prior to the Notice of Allowance that was issued on November 5, 2002. Appellants submit that Wu, et al. do not teach or suggest an *upper plate electrode composed of SiGe polysilicon* and therefore do not render Appellants' poly-poly capacitor obvious. In contrast to Appellants' claimed structure, the capacitor structure disclosed in Wu, et al. comprises *lower polycrystalline SiGe plate* electrode 102, capacitor dielectric layer 82, and upper polysilicon cell plate 84. Appellants note that the Notice of Allowance was withdrawn in light of Thakur, et al.

The §103 rejections also fail because there is no motivation in the applied references which suggests modifying the structures described therein to include Appellants' claimed poly-poly capacitor in which the planar upper plate electrode is composed of *SiGe polysilicon*. The rejections are thus improper since the prior art does not suggest this drastic modification. The law requires that a prior art reference provide some teaching, suggestion, or motivation to make the modification obvious. "The mere fact that the prior art may be

modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification.” *In re Fritch*, 972 F.2d, 1260,1266, 23 USPQ 1780,1783-84 (Fed. Cir. 1992).

Here, there is no motivation provided in the disclosures of the applied prior art references, or otherwise of record, which would lead one skilled in the art to make the modification mentioned hereinabove. The disclosure of Thakur, et al. fails to provide proper motivation to produce Appellants’ poly-poly capacitor as recited in Claim 28 for the same reasons Thakur, et al. is deficient in providing motivation to produce Appellants’ inventive structure with regard to Claim 27, as discussed in Section III of this brief. To reiterate, Thakur, et al. do not disclose SiGe polysilicon electrodes or Appellants’ disclosed process conditions for forming SiGe polysilicon electrodes and therefore fail to provide the motivation to modify the capacitor disclosed in Thakur, et al. to produce the Appellants’ structure. Lee and Wu, et al. also fail to provide motivation to modify the capacitor disclosed in Thakur, et al. to provide Appellants’ claimed poly-poly capacitor.

There is no suggestion in the prior art of Appellants’ claimed poly-poly capacitor structure. Therefore Claim 28 of the present application are not obvious from the combination of Thakur, et al. and Lee.

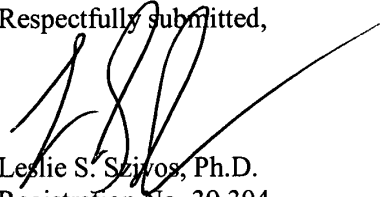
In view of the above remarks, Appellants respectfully submit that Claim 28 is patentable subject matter over the combined disclosures of Thakur, et al. and Lee.

9. Conclusion

The above arguments establish that all of the claims on appeal are enabled, definite and patentable over the substantive grounds of rejection raised in the Final Rejection.

Appellants therefore respectfully request that the substantive grounds used in rejecting Claims 24-28, on appeal, made by the Examiner, be reversed by the Board of Patent Appeals and Interferences.

Respectfully submitted,



Leslie S. Szivos, Ph.D.
Registration No. 39,394

SCULLY, SCOTT, MURPHY & PRESSER
400 Garden City Plaza
Garden City, New York 11530
(516) 742-4343

LSS:HAH:kc